TD 99-XXX

HGQ-05 production report

I. Novitski, N. Andreev, R. Bossert, D.Chichili, J.Kerby, F. Nobrega, A. Makarov, J. Ozelis, T. Arkan, S. Yadav, A. Zlobin.

Contents

1. Introduction

HGQ-05 is the fourth of several 2-meter long model IR quadrupole magnets to be built at FNAL in support of the LHC project at CERN. The baseline design is described in the HGQ Conceptual Design Report. This report consists of data collected during magnet fabrication and production tests.

Table 1.1. Magnet logs.

Inner Cable Strand No.	38
Inner Cable lay direction	Right Lay
Outer Cable Strand No.	46
Outer Cable lay direction	Left Lay
Cable Pre-baking	None
Inner Cable Insulation	***25uM x 9.5mm w/ 55% overlap surrounded by 50uM x 9.5mm w/2mm gaps w/Epoxy***
Outer Cable Insulation	***25uM x 9.5mm w/ 43% overlap surrounded by 25uM x 9.5mm w/50% overlap w/Epoxy***
Coil Curing temperature	***135C***
Inner Coil target size	***+.009 in., +225uM***
Inner Coil MOE	***8GPa***
Outer Coil target size	***+.006 in., +150uM***
Outer Coil MOE	***11GPa***
Target Prestress	***65-70MPa***
Coil end azimuthal Shim	Shim ends to be same as body, tapering off toward end of saddle.
End Part Material	***G-10***
End Part Configuration	Iteration #1, 4 block design. Wedges extended in outer coil. Saddles shortened by 21mm.
Splice Configuration	Internal
Voltage Tap Plan	MD-344972/MD-344973
Inter layer strip heaters	Traditional, single element.
Outer layer strip heaters	***McInturff design, double element.***
Key extension	***None***
Inner coil Bearing Strips	***Brass, cut in 3 inch segments, same as collar packs.***
Outer coil Bearing Strips	***Phosphor bronze, cut in 3 inch segments, same as collar packs.***
Collar configuration	***3 inch long "solid" welded packs, with 49 lamination period.***
Collar key configuration	***3 inch long, positioned same as packs.***
Strain Gauges	***4 beam gauges on outer coil, 4 capacitor gauges on inner coil, 4 capacitor gauges on outer coil.***
Spot Heaters	***Pole turn on 2 outer coils, at lead end on parting plane turn on 1 outer coil.***
End Radial Support	***Collets end clamps on both ends. Aluminum exterior cans with G-10 quadrant pieces.***
Collar/Yoke Interface	Radial clearance between collar and yoke.
Configuration	***Single lead with copper only cable for stabilizer***
End longitudinal loading	***Bullets apply load directly to coils, 2000 lbs. force per bullet. End cans are bolted to end plates longitudinally, preventing coils from contracting longitudinally.***
Yoke Key Width	24mm
Strain Gauges on Skin	Yes
End Plate Thickness	50mm
Tuning Shims	***Layed into collared coil/yoke. Fixed in place.***
Other	Inner coils recured to increase MOE. 2 collar packs with thermometers.

Coil Fabrication Start Date	8/17/98
Collared Coil Start Date	1/25/99
Yoke Assy Start Date	2/10/99
Completion Date	2/24/99